

The Development of a Differential Deposition Technique for Figure Correction in Grazing Incidence Optics

Completed Technology Project (2010 - 2014)



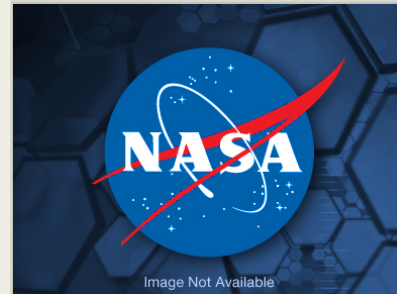
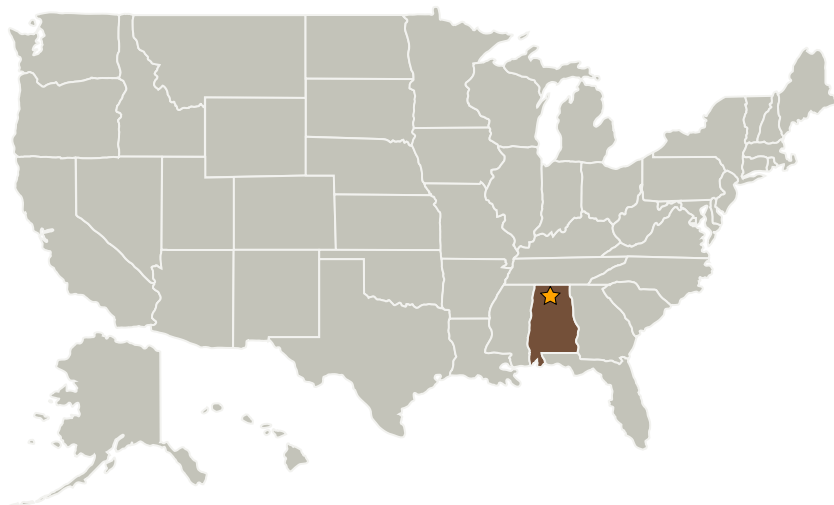
Project Introduction

We propose the development of a physical-vapor-deposition coating technique to correct residual figure errors in grazing-incidence optics. The process involves selectively depositing a filler material to smooth out the low-to-mid-spatial-frequency errors that typically dominate the performance of x-ray optics. We have demonstrated proof-of-concept on small (few-cm scale) full-shell optics intended for medical imaging. We propose here to scale the process up to larger mirrors applicable to astronomy. Simulations indicate that given adequate metrology, substantial improvements in angular resolution are possible through application of the technique. The process is applicable to full shell or segmented optics, either mounted or unmounted, and can in principal also be used to figure short reflectors. Examples of programs that could benefit from this technique include the large mission IXO and smaller explorer-class missions such as WFXT.

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama

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Primary U.S. Work Locations

Alabama

Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Astrophysics Research and Analysis

Project Management

Program Director:

Michael A Garcia

Program Manager:

Dominic J Benford

Principal Investigator:

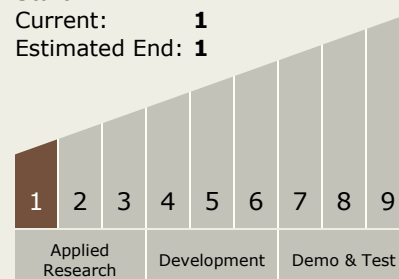
Brian D Ramsey

Technology Maturity (TRL)

Start: 1

Current: 1

Estimated End: 1



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.2 Observatories
 - └ TX08.2.1 Mirror Systems

Target Destination

Outside the Solar System